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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/049,736	07/22/2002	Mino Green	BKY 2 0078	4575

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EXAMINER	
DEO, DUY VU NGUYEN	
ART UNIT	**PAPER NUMBER**
1765	

DATE MAILED: 03/24/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/049,736	GREEN, MINO	
	Examiner	Art Unit	
	DuyVu n Deo	1765	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 January 2005*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) *24* is/are withdrawn from consideration.

5)☒ Claim(s) *21-23* is/are allowed.

6)☒ Claim(s) *1-9,11-13,15 and 17-20* is/are rejected.

7)☒ Claim(s) *10,14 and 16* is/are objected to.

8)☒ Claim(s) *24* are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1-9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Green et al. (Quantum pillar structures on n+ gallium arsenide fabricated using "natural" lithograph) and Haginoya et al. (Nanostructure array fabrication with a size-controllable natural lithography).

Green describes a method for forming semiconductor device comprising: depositing a thin film of highly soluble solid CsCl onto a flat hydrophilic substrate; exposing the CsCl film to a solvent vapor, water, under controlled conditions to that the film reorganizes into an array of discreet hemispherical islands on the surface; subjecting the resulting structure to a RIE etching so as to form a well at the position of each hole (pages 264-265). Unlike claimed invention, Green doesn't describe depositing a resist material over the substrate and removing the hemispherical structure together with their coating of resist material leaving a resist layer with an array of holes corresponding to the islands. Haginoya describes a method for fabrication of semiconductor device wherein he teaches forming a resist material of Pt-Pd film on a polysterene bead array. The polysterene beads are removed with the Pt-Pd film thereon and leave a Pt-Pd mask on the substrate (claimed lift-off process) (pages 2934-2935). It would have been obvious for one skilled in the art to modify Green mask in light of Haginoya's method of forming the

mask because Haginoya teaches that his method would improve the natural lithography, used by Green, by provide the ability to control the nanostructure size (page 2934, left column).

Referring to claim 4, the substrate of SiO2 layer on silicon would be obvious to one skilled in the art since Green suggests using silicon and semi-insulating material (page 265, right column, first paragraph).

Referring to claim 6, Haginoya further teaches of sputter-evaporating the resist material onto the substrate (page 2935, left column).

Referring to claim 7, even though applied prior art doesn't describe using Al; however, since Al is a well known material used by one skilled in the art, and Haginoya doesn't limit the resist to Pt-Pd material only, therefore, it would have been obvious to one skilled in the art to use other material such as Al as long as it can provide a mask for the etching process with a reasonable expectation of success.

Referring to claim 8, ultrasonic agitation is a well-known method, for the wet process, that would enhance the solving process and therefore, would be obvious to one skilled in the art to use in forming the mask described above.

3. Claims 11-13, 17-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kiyoku et al. (US 6,153,010), Green et al. (Quantum pillar structures on n+ gallium arsenide fabricated using "natural" lithograph) and Haginoya et al. (Nanostructure array fabrication with a size-controllable natural lithography).

Kiyoku describes a method for forming semiconductor device comprising: forming a layer 12 of first material of semiconductor; forming an insulating layer pattern, such as SiO2, SiN, TiOx, and ZrOx, on the surface of the first material (this would provide a hydrophilic

substrate); growing crystals of second material 15 or 16 of semiconductor on the first material in the regions exposed by the pattern so as to form island at the position of each holes (fig 1; col. 4, line 65; col. 5, line 34-40; col. 6, line 10, 11; col. 8, line 1-30). Unlike claimed invention, Kiyoku doesn't describe the pattern is formed using the method of claim 1. Green and Haginoya teach method for forming holes (pattern) in the insulating layer as described above. It would have been obvious for one skilled in the art to form holes (pattern) in light of Green and Haginoya because they teach a method that can form pattern with an ability to control the structure size as described above with a reasonable expectation of success.

Referring to claim 12, figures 1B-1C in Kiyoku show the second material 15 or 16 extends over the insulating layer.

Referring to claims 17-20, since applied prior art above describes the claimed method, it would also describe claimed structure of crystalline heterostructure.

Allowable Subject Matter

4. Claims 10, 14 and 16 remained allowable as indicated in the previous office action.

5. Claim 21 is allowed because applied prior art doesn't describe or suggest depositing a film of a resist material over he surface, the film having a thickness of less a fifth of an average diameter of the islands.

6. Claims 22, 23 are allowed because applied prior art doesn't describe or suggest depositing a film of a resist material over the surface by directing a vapour stream of resist material at a grazing angle of incidence to the surface.

Election/Restrictions

7. Newly submitted claim 24 directed to an invention that is independent or distinct from the invention originally claimed for the following reasons: the invention of claim 24 does not relate to a single general inventive concept under PCT Rule 13.1 because, under PCT Rule 13.2, it lacks the same or corresponding special technical feature of an array of wells having an elliptical cross-section.

Since applicant has received an action on the merits for the originally presented invention, this invention has been constructively elected by original presentation for prosecution on the merits. Accordingly, claim 24 withdrawn from consideration as being directed to a non-elected invention. See 37 CFR 1.142(b) and MPEP § 821.03.

Response to Arguments

8. Applicant's arguments filed 1/3/05 have been fully considered but they are not persuasive.

Applicant's argument that there is no motivation to combine the references is not persuasive because applicant has not traversed the reason for the combining of the references provided in the office action.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Referring to applicant's argument that Green and Haginoya teach two distinct and incompatible technologies and therefore it is not obvious to combing the references is not

persuasive because they both describe method of forming masks used for etching substrate. Haginoya provides a better technique for forming the mask. Therefore, they are related technologies, and it is proper to combine the references.

In response to applicant's argument that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

Conclusion

9. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 571-272-1462. The examiner can normally be reached on 6:00-3:30; with alternate Friday off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nadine Norton can be reached on 571-272-1465. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Primary Examiner
Duy-Vu N. Deo
3/21/05